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on
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Prepared by
Project Treasure Island
for
Directorate of Intelligence, USAF
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This report contains information requested on the Porabka Dam on the Sola River in Poland.

The report is the result of a study of French, German and Polish open sources, published between 1929 and 1952 and listed in the attached bibliography. The most valuable information was found in sources listed under Nos. 1 and 2.

The report was compiled in accordance with the P.V.D. questionnaire as follows:

I. Functions

A. The system of which the dam forms a part

The Porabka Dam is a part of the system controlling flood and navigation on the Vistula River. The Porabka Power Plant works as a peak-load plant for the electric power system of the Cracow region (Figs. 1 and 2).

B. The dam within the system

1. The main purpose of the Porabka Dam is to protect the upper reaches of the Vistula River from floods.

2. The second purpose of the dam is to improve the navigability of the Vistula.

3. The third purpose is power production.

C. Highways and railways resting on the dam or adjacent thereto

There is a road resting on the dam, as shown in Figs. 7 and 8. A new highway was built in 1935 along the left bank of the Sola River. A bridge was built on Sola River in Tresna.

D. Navigation locks in connection with the dam

No navigation locks were built, as the Sola River is not navigable.

II. Location and designation

A. Data which will make possible pinpointing the installation

See map Fig. 1. Porabka is located on the Sola River, in the province of Cracow (Wojewodztwo Krakowskie), county of Biala, 39 km north of the town of Zywiec, east of the towns of Bielsko and Biala.

B. Official, local, and popular names of dams and dependent installations

Porabka.

III. Dimensions

A. Dam

1. Maximum and minimum head on dam

Maximum head is 21 m.

Minimum head is 14 m.

Effective head is between 16 and 18 m.

2. Maximum and minimum depth of water below the dam

No information available.

3. Total height of dam above river bed and above foundations

Height above river bed is 22 m.

Height above foundations is given as 35 m (according to German sources) or 40 m (according to French sources).

4. Elevation of bottom of penstocks at dam

There are no outside penstocks, only intake pipes built through the dam.

5. Total thickness at base and at high water level

No information available on thickness at base.

Thickness at crest is 8.4 m.

6. Slopes of dam faces

No information available.

7. Length at crown, across river bed and along spillway

Length at crown is 260 m (German source, 1940); also given as 246 m (Polish source, 1929).

B. Reservoir

1. Capacity

Total capacity is 32,000,000 - 35,000,000 cu m.

2. Area

The area of the reservoir is 380 ha.

3. Length, width, and depth (including profiles)

The length of the reservoir is about 7 km.

4. Detailed plan in vicinity of the dam

The elevation of the Sola River valley at Porabka is about 300 m.

The Porabka Dam is built on the lower slopes of the Beskid Mountains, covered with pine forest (Figs. 3, 7 and 8).

C. Navigation locks in connection with the dam (structural details)

No navigation locks were built in this dam since the Sola River is not navigable.

IV. Hydrological data (rainfall, flow, etc.)

Rainfall data for the Sola River at Porabka are: 934 mm (1933); 1,065 mm (1934).

Average recorded water levels on Sola River at Porabka:

1934, July 16 - 95 cm; July 18th - 386 cm

1934, Sept 2 - 114 cm; Sept 3 - 234 cm.

The average discharge of the Sola River is 18 cu m/sec

The flood discharge is 1,300 cu m/sec.

The Porabka Dam reduces the flood flow to 375 cu m/sec, thus eliminating flood danger for valleys and settlements.

V. Foundation conditions and soil characteristics under and near the dam

The catchment area of the Sola River belongs to the Western Carpathian Mountains, in its upper reaches, and to the Tertiary Beskides in the middle and lower reaches (see map Fig. 1). Below the town of Zywiec the Sola River flows through a wide zone of flysch formation which consists of a thick deposit of sandstone, belonging partly to the early Tertiary era, and in part to the Cretaceous and Permian periods. The sandstone is partly uniform and partly conglomerates. Between the layers of sandstone are layers of clay slate. Faulted strata are frequently encountered.

A cut-off grounting screen was made under the foundations by injecting liquid cement.

VI. Design data

A. Structural type or types

The Porabka Dam is a straight axis gravity type dam with buttresses made as a multiple arch type (Figs. 3, 4, 5, 6, 7, 8, 9 and 10).

B. Materials used

About 100,000 cu m of plastic concrete was used.

C. Design criteria

No information available.

D. Details and equipment (penstocks, control gates, inspection galleries, cranes, etc.)

Spillways

There are five spillways controlled by taintor gates near the left bank (Figs. 7, 8, 9, 10 and 11).

Stilling basin

The stilling basin has three rows of baffles (Figs. 7 and 8).

Cranes

There is no crane on top of the dam.

VII. Special data on power dams

The construction of the Porabka Dam was started in 1921 as a part of a large plan for the control of flood and navigation. The construction was delayed due to financial difficulties, and eventually completed in 1936, except for the powerhouse. As seen in drawings and models published in 1929, the powerhouse was included in the plan. It was erected after the war (Fig. 12). Exact data are not available.

A. Capacity (kva), present and proposed

According to prewar German and Polish sources, the planned capacity of the Porabka Powerhouse was 20,000 kw. According to 1946 Polish sources, the planned capacity was 30,000 kw.

B. Output (kwhr) achieved and proposed

The monthly output of electric energy was expected to vary between 1.5 and 3.5 million kwhr. For separate months that output was to be (in millions of kwhr):

January - 2.23	July - 1.70
February - 2.17	August - 2.56
March - 3.38	September - 1.52
April - 3.37	October - 1.87
May - 2.56	November - 1.86
June - 2.02	December - 1.53.

The annual output was planned for an average of 27,000,000 kwhr.

C. Powerhouse

1. Location

The powerhouse is located at the right end of the dam (Fig. 6).

2. Structure

No data available (Fig. 12).

3. Installations

It was planned to install 3 units in the powerhouse.

4. Number, dimensions and type of penstocks

There are no penstocks at this dam.

The intake pipes for the turbines are imbedded in the dam.

D. Places of installations served; ties with power grids

The Porabka Hydroelectric Power Plant is interconnected with the power grid of Lower Silesia and the Cracow Region. The plant works as a stand-by reserve for the large generating units of Silesia.

E. Location and description of transformer yards and transmission system

No data available.

VIII. Historical data

A. Name and background of the designer

The construction of the dam was undertaken by the Polish Government. The chief engineer of the construction works was SKRZYNSKI.

B. Dates of construction

The work on the dam was started in 1921.

The dam was completed in the fall of 1936, and has been in operation since December 13th of that year, controlling flood and navigation. The production of electric energy was considered secondary.

The construction of the power plant was postponed, but completed under the Six-Year Plan, after the war.

C. Sources of materials

No data available.

D. Records of war damage, removal of equipment, etc.

No data available.

E. Data on conditions of structure at any date

The latest information on the dam is dated December 1953.

F. Proposals for enlargement, alteration, or extension of functions

An article in a Polish source of July 1952 criticizes the fact that the Porabka Dam was built as a concrete gravity dam, which makes it impossible to increase the capacity of the reservoir as in the case of a rock-fill dam. Considerable expansion of Porabka Reservoir is deemed necessary.

IX. Graphical material

A. Photographs, especially those taken during construction

Photographs attached to this report are shown in Figs. 3, 4, 5, 6, 7, 8, 9, 10, 11 and 12.

B. Working drawings, general and detailed

Not available.

C. Record and publication drawings

Drawings attached to this report are shown in Figs. 1 and 2.

D. Sketches by persons who have seen installations

Not available.

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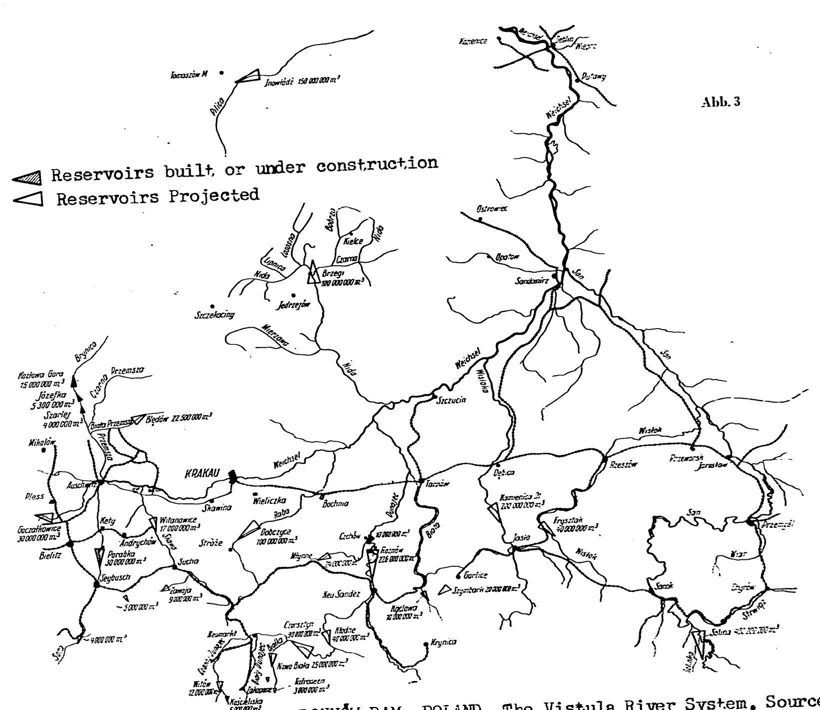
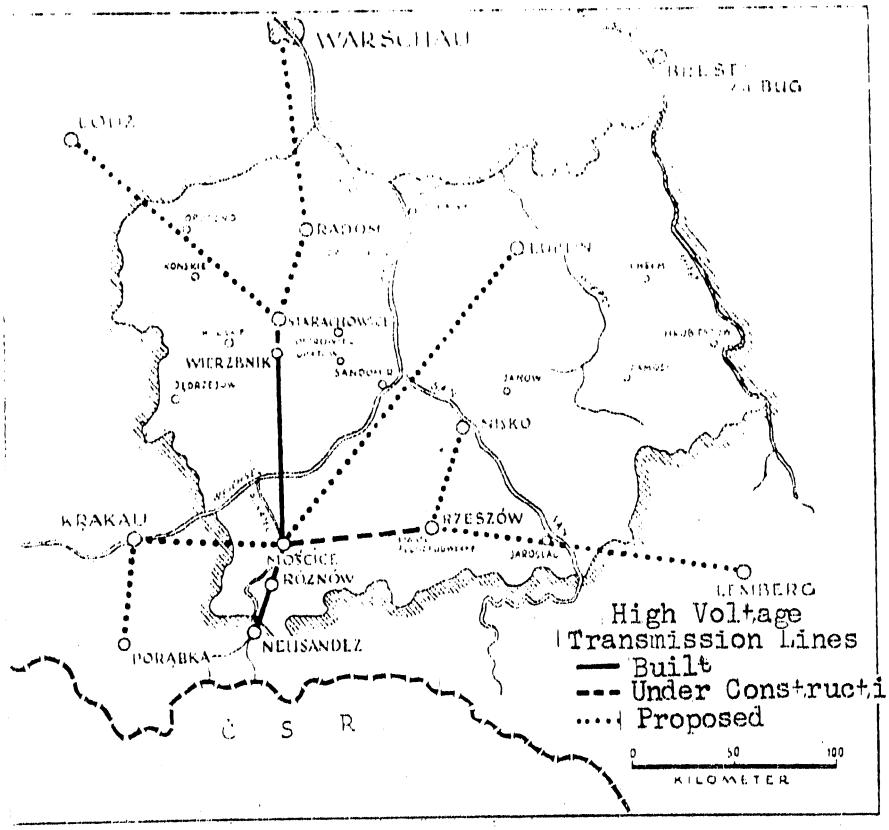
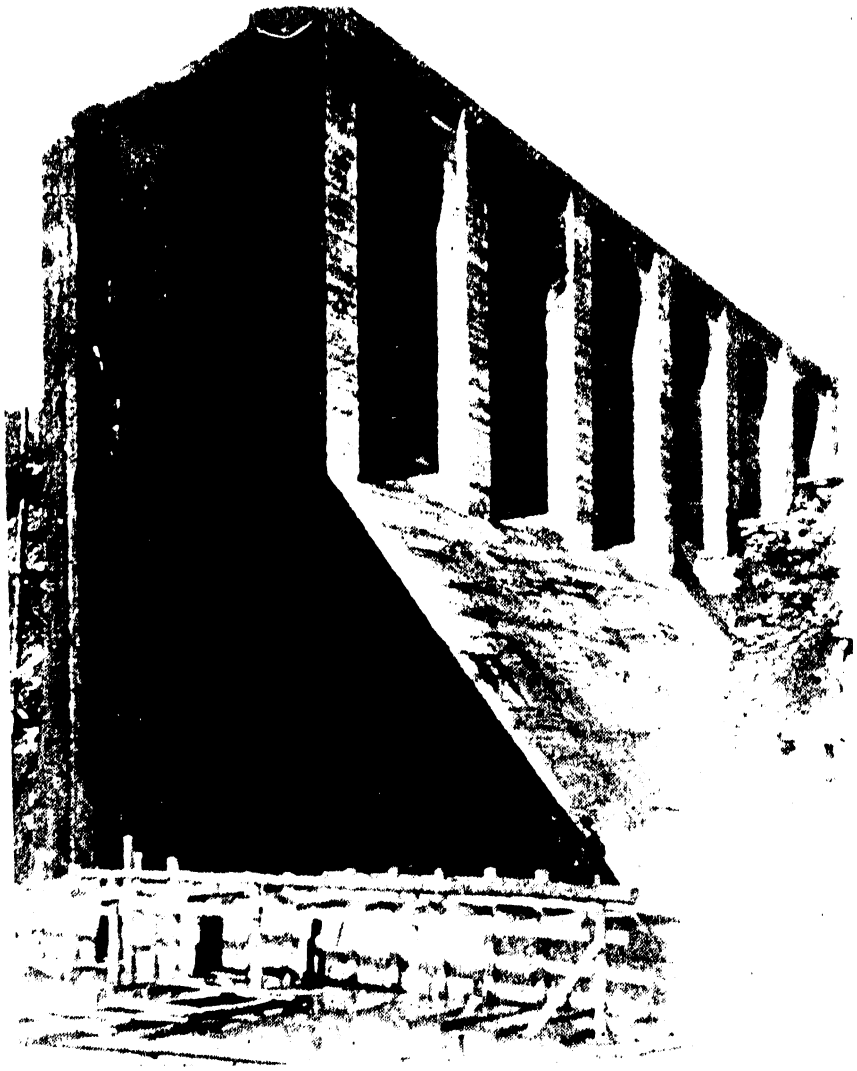


ROZNÓW DAM, POLAND. The Vistula River System. Source: Deutsche Wasserwirtschaft, Munich, Febr.1941,No.2,p.65

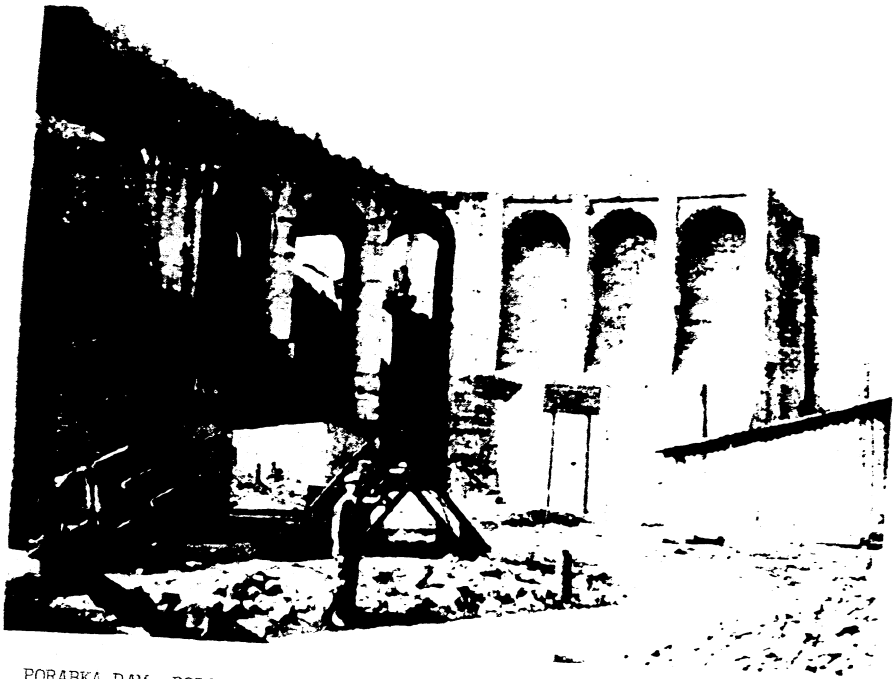


PORABKA, ROZNOW, AND CZCHOW DAMS, POLAND. High Voltage Transmission Lines in the Central Industrial Region of Poland, as of end of 1937. Source: Ostland Institute, (Danzig),"C.O.P. Das Zentrale Polnische Industrierevier." 1938, p. 25

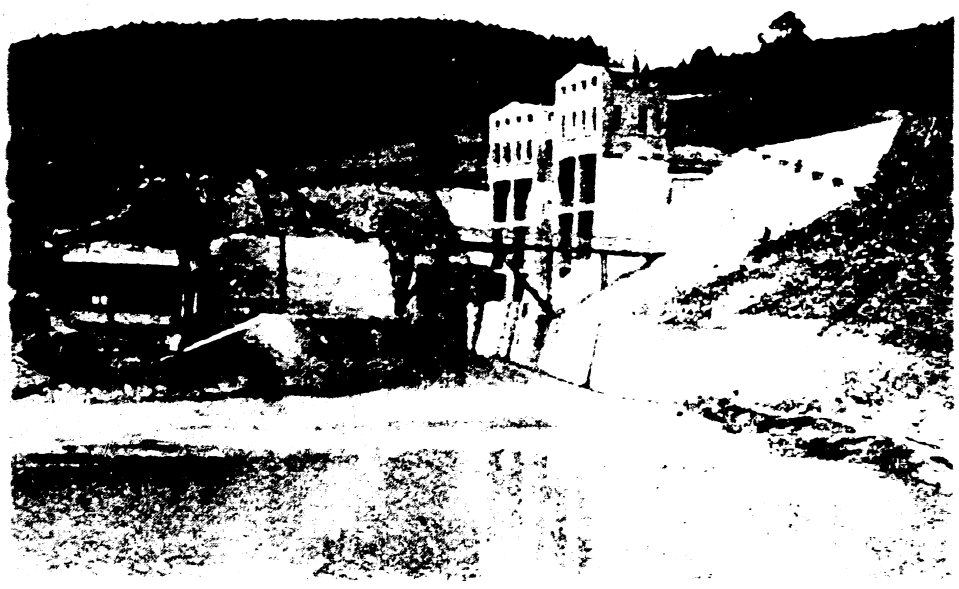
PORABKA DAM, POLAND. Site of the Dam. Source: Przeglad Mechaniczny(Warszawa), 1955, No. 4, p. [illegible]



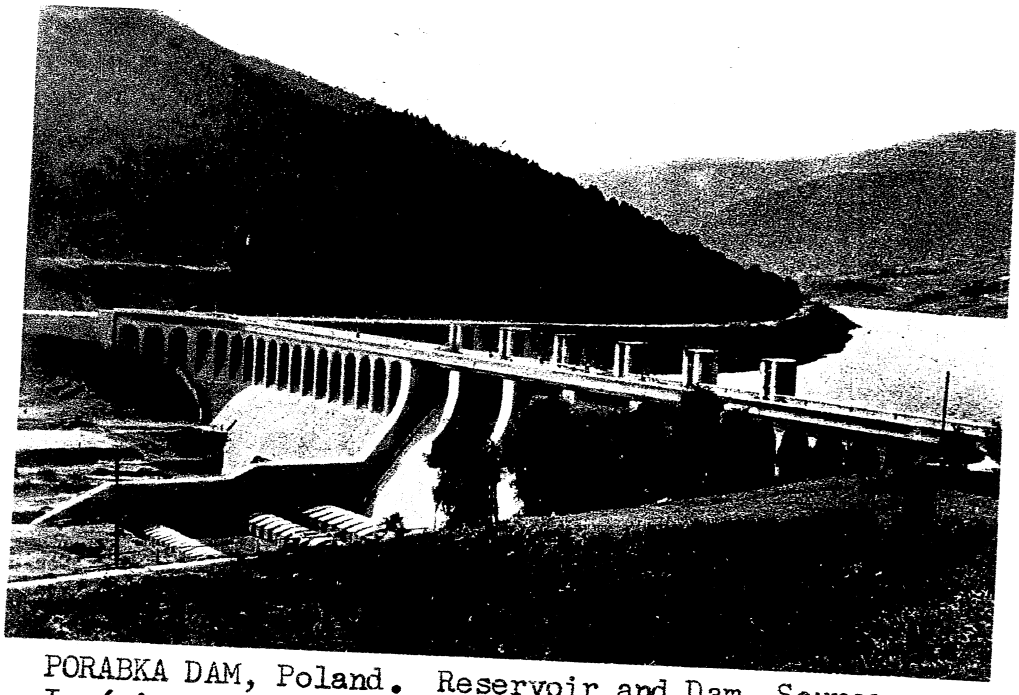
PORABKA DAM, POLAND. Left Bank Abutment under Construction. Source: Przeglad Mechaniczny(Warszawa), 1935, No. 4, p. 113



PORABKA DAM, POLAND. Right Bank Abutment under Construction. Source: Przeglad Mechaniczny(Warszawa), 1936, No. 1, p. 9



PORABKA DAM, POLAND. Intake Towers. Source: Przeglad Mechaniczny(Warszawa), 1936 63
No.1, p.8



PORABKA DAM, Poland. Reservoir and Dam. Source: Ingénieurs, Arts et Métiers, Paris, 1939, p. 87

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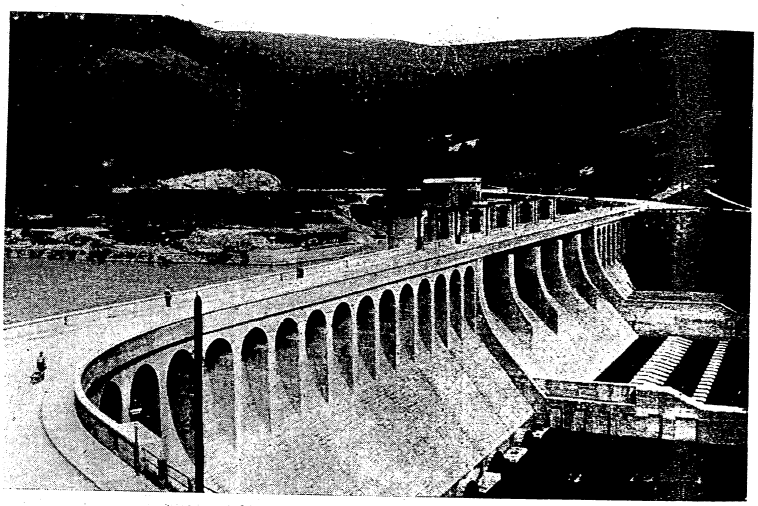
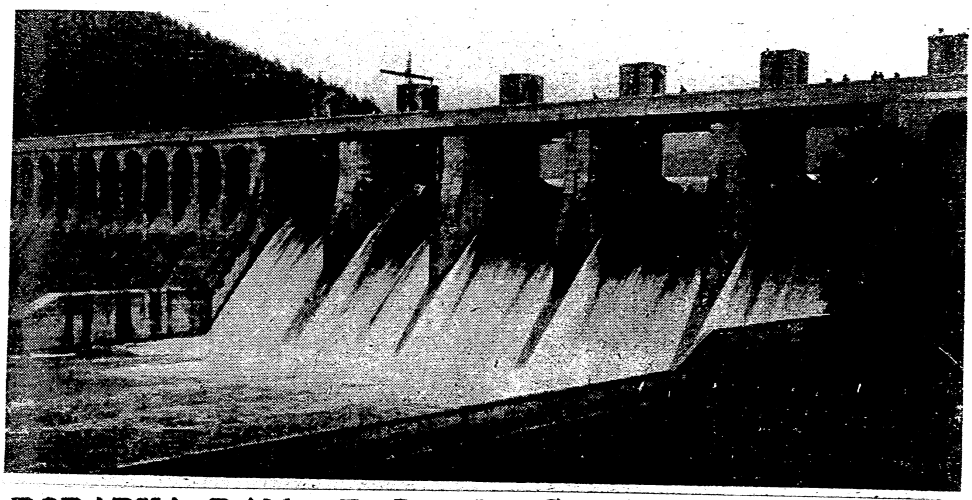
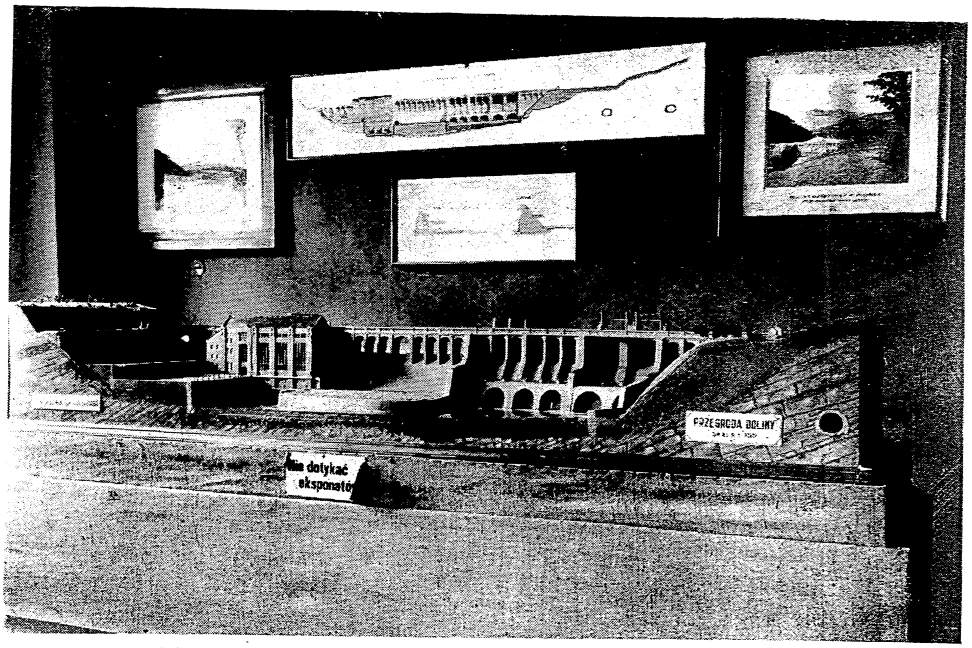


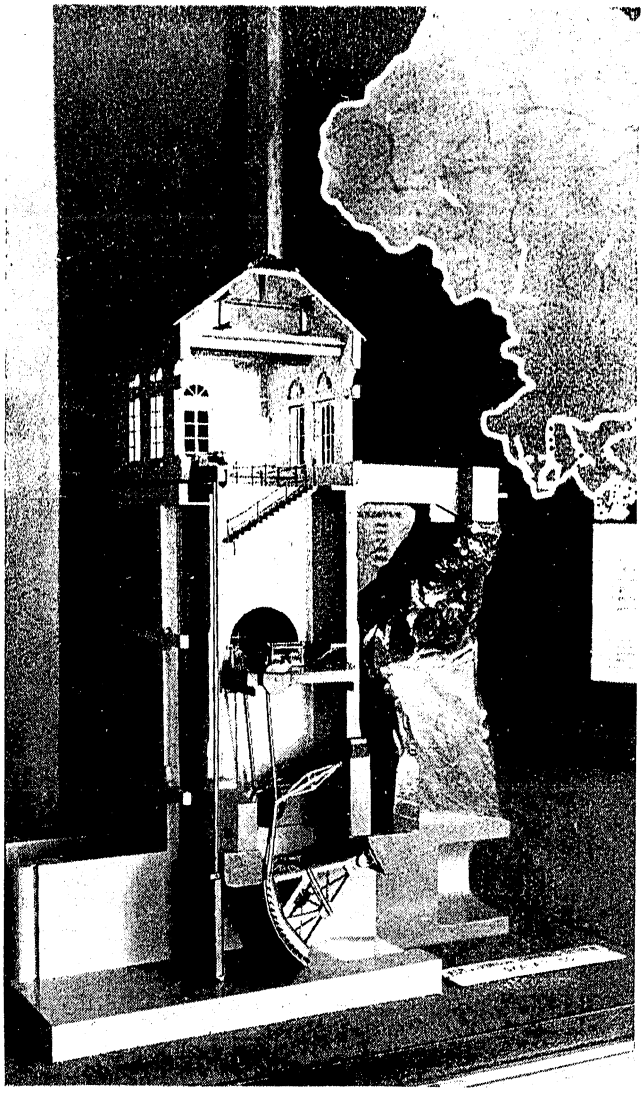
PORABKA DAM, Poland. Tailrace View of the Dam. Source: Przeglad Elektrotechniczny, Warsaw, 1939, p. 408



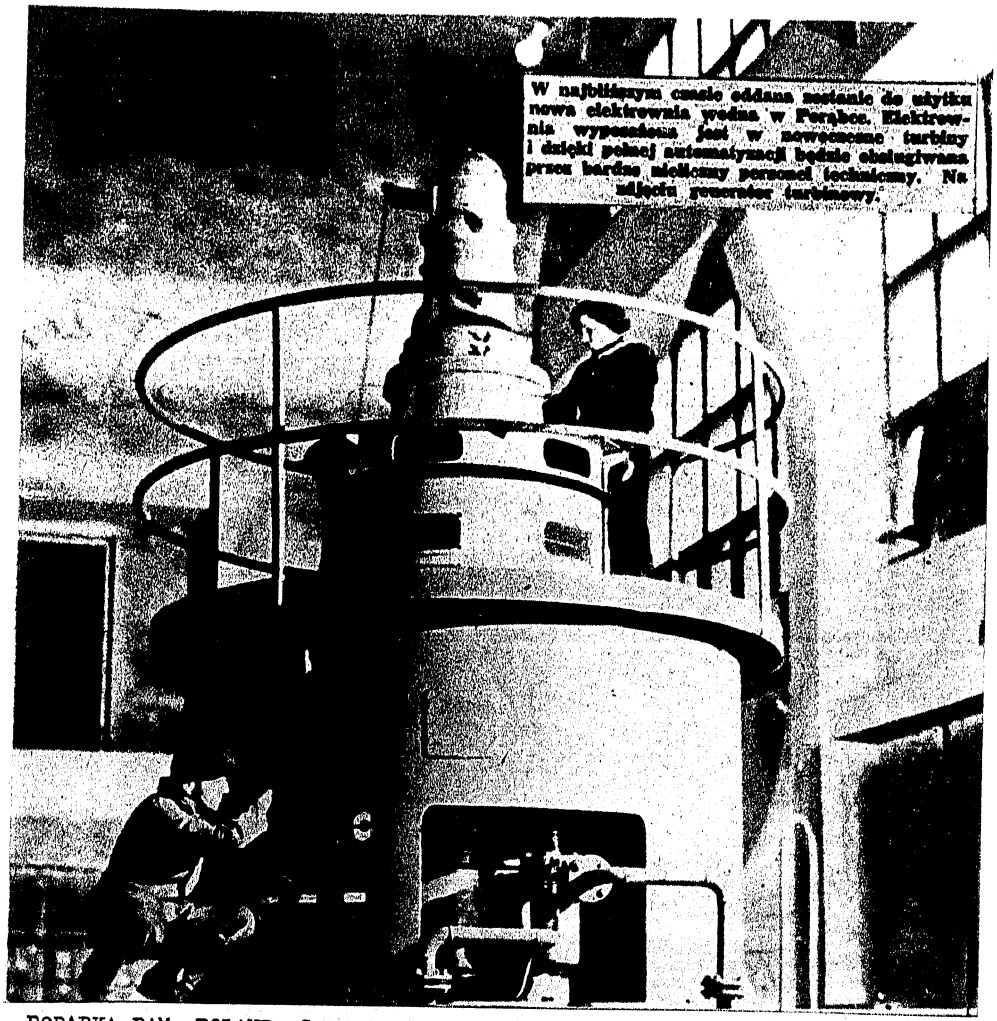
PORABKA DAM, Poland. Spillway. Source: Przeglad Elektrotechniczny, Warsaw, June 7th, 1939, p. 409



PORABKA DAM, POLAND. A Model of the Dam. Source: Przeglad Techniczny(Warsaw), No.40-41, Oct. 2-9, 1929, p. 926



PORABKA DAM, POLAND. A Model of the Gate. Source: Przeglad Techniczny (Warsaw), No. 40-41, Oct. 2-9, 1929, p. 927



PORABKA DAM, POLAND. Generator. Source: Nowa Wieś (Warsaw), 1953, No. 50, p. 2